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Inspection Manual for Enforcement of New Source Performance Standards Secondary Lead Smelters

Engineering-Science, Inc, McLean, Va

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INSPECTION MANUAL FOR ENFORCEMENT OF NEW SOURCE PERFORMANCE STANDARDS

SECONDARY LEAD SMELTERS

U.S. ENVIRONMENTAL PROTECTION AGENCY
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This document presents guidelines to enable enforcement personnel to determine whether new or modified secondary lead smelters comply with New Source Performance Standards (NSPS). Key parameters identified during the performance test are used as a comparative base during subsequent inspections to determine the facility's compliance status. The secondary lead smelter process, atmospheric emissions from this process, and emission control methods are described. Inspection methods and types of records to be kept are discussed in detail.

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INSPECTION MANUAL FOR
ENFORCEMENT OF NEW SOURCE PERFORMANCE STANDARDS:
SECONDARY LEAD SMELTERS

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1.0 INTRODUCTION

In accordance with Section 111 of the Clean Air Act, the Administrator of the U.S. Environmental Protection Agency (EPA) promulgated particulate and opacity standards of performance for new and modified secondary lead smelters. The standards became effective 8 March 1974 and apply to sources the construction or modification of which was commenced after 11 June 1973. The standards are applicable to blast (cupola) furnaces, reverberatory furnaces, and pot furnaces of more than 250 kg (550 lb) charging capacity.

Under these new source performance standards, a performance test must be conducted on any new or modified secondary lead smelter to ensure that control equipment is designed and installed which will provide compliance with the standard. After determining that the facility with its control equipment does, in fact, comply with the standards, it is the further intent of the regulations that the equipment not be allowed to deteriorate to the point where the standards are no longer maintained. In fact, a specific provision of the regulations 60.11(d) provides that affected facilities shall be operated and maintained "in a manner consistent with good air pollution control practice for minimizing emission."

The purpose of this manual, therefore, was to provide the air pollution inspector with necessary information so that he could determine whether or not a smelter was still in compliance for some period of time after the conduct of initial performance tests. To provide for this continuing enforcement of emission standards, the Division of Stationary Source Enforcement of the U.S. Environmental Protection Agency properly anticipated the need for a series of field inspection manuals which could be used by an air pollution control official to assist him in determining whether a pollution source was complying with all applicable regulations. While this manual was developed primarily to meet the need for enforcement of EPA's new source performance standards, it was intended that the information contained herein would be equally useful for enforcement of state regulations applicable to all existing secondary lead smelters.

In both cases the regulations may be enforced by either Federal or state air pollution control authorities. Each state may develop

a program for enforcing the Federal new source performance standards applicable to sources within its boundaries. If the proposed program is adequate, EPA will delegate implementation and enforcement authority to the state for all affected sources with the exception of those owned by the U.S. Government. Also, each state was required to submit implementation plans to EPA in 1971 that included emission regulations which would reduce emissions and ensure attainment and shadow maintenance of the ambient air quality standards (Section 110 of the Clean Air Act). If the regulations are not enforced at the state level, then EPA is legally obligated to enforce the State's Implementation Plan. If a Federal inspector observes a violation of a state's regulation adopted under the State Implementation Plan, he can co-equally enforce the SIP regulation.

The scope of this manual includes all processes normally found in secondary lead smelters. It should be equally applicable to both existing and new facilities. It does not cover primary lead smelters which use ore concentrates as their lead source.

This report was prepared from information previously published on secondary lead smelters and refineries, from stack tests of several furnaces at lead smelters, from applicable rules and regulations promulgated by EPA and published in the Federal Register, and from past experiences of the air pollution control staff of Engineering-Science, Inc. The assistance of staff from the Division of Stationary Source Enforcement was particularly helpful in providing direction for the project.

3.0 NSPS AND SIP REQUIREMENTS

3.1 NEW SOURCES--NSPS

The Federal emission regulations applicable to new or modified secondary lead smelters are called New Source Performance Standards (NSPS). They are published in the Code of Federal Regulations under Title 40 CFR Part 60. The standards require control at a level typical of a well controlled existing smelter and are attainable with existing technology. To determine the emission level which should be selected as the standard, extensive on-site investigations were conducted and design factors, maintenance practices, available test data, and the character of stack emissions were considered by EPA. Economic analyses were also conducted prior to promulgating the standards. An EPA document which provides background information on the derivation of the standards is entitled "Background Information for Proposed New Source Performance Standards"(3).

Provisions of the regulation are applicable to three types of furnaces commonly found in a secondary lead smelter-reverberatory furnaces, blast (cupola) furnaces, and pot furnaces of more than 550 pound charging capacity. A secondary lead smelter is defined as any facility producing lead from a lead bearing scrap material by smelting to the metallic form. Included in the definition are furnaces for melting lead alloy for newspaper linotype if such furnaces meet the size requirements. On and after the date on which the performance test required to be conducted by paragraph 60.8 is initiated but no later than 180 days after initial startup, no owner or operator subject to the provisions of the regulations shall discharge or cause the discharge into the atmosphere from a blast furnace (cupola) or reverberatory furnace any gases which

1) Contain particulate matter in excess of 50 mg/dscm (0.022 gr/dscf); or

2) Exhibit 20 percent opacity or greater.

Likewise, the effluent gases discharged from a pot furnace larger than 550 pounds charging capacity shall not exhibit 10 percent opacity or greater.

The opacity standards exclude uncombined water vapor. No new emission standard was promulgated for pot furnaces since emissions were estimated to be less than from blast or reverberatory furnaces (smelters with pot furnaces controlled by baghouses or scrubbers were observed to have visible emissions less than 10 percent opacity).

3.0 EXISTING SOURCES--SIP

Under the 1970 Clean Air Act amendments, each state in 1971 had to file with EPA a State Implementation Plan which included emission regulations to achieve and maintain ambient air quality standards. EPA encouraged some uniformity and reasonable stringency of the standards by publishing suggested standards as Appendix B of a regulation on preparation of State Implementation Plans (5). In the case of particulate emissions, EPA published a reference process weight table (Table 3-1) representative of data from the state and local regulations. Thus, Federal standards are stated with respect to grain loading in the emitted gas while the state standards are generally stated with respect to the mass emissions from the process.

No state or local agency now has an emission standard specifically for the secondary lead smelters. Instead, process weight regulations are commonly employed by many state and local jurisdictions to limit particulate emissions from a variety of industrial sources. However, the actual limits vary from state to state so Table 3-1 should be considered illustrative only and should not be referenced for enforcement purposes. Furthermore, state regulations are frequently modified and may contain qualifications, exceptions or special provisions for certain source categories.

By definition, process weight per hour means "the total weight of all materials introduced into a special process that may cause any emissions of particulate matter" to the atmosphere. In some industries this definition of process weight is somewhat complicated. In the secondary lead industry, however, the process weight refers to the amount of charge fed to the furnace and these quantities are normally recorded in the operator's daily log for each furnace.

For a typical blast furnace rated at 50 tons/day (production output) with an exhaust gas flow rate of 15,000 dscfm, the New Source Performance Standards (NSPS) will allow the furnace to emit 3.8 lb/hr of particulate matter. By comparison, the reference process weight regulation (see Table 3.1) for that size blast furnace (83 tons/day, or 6900 lbs/hr charge rate) would limit particulate to only 7.6 lb/hr.

Therefore state and local regulations are less stringent than the NSPS for blast and reverberatory furnaces. The most stringent of the state and local standards restrict particulate emissions of 20- to 60-ton furnaces to 4 to 8 lb/hr, which corresponds to

Table 3.1 REPRESENTATIVE DATA FROM PROCESS WEIGHT CURVE

Process weight rate, lb/hr	Allowable emission rate, lb/hr
50	0.30
100	0.55
500	1.93
1,000	3.35
5,000	8.34
10,000	9.73
30,000	14.99
60,000	19.60
80,000	21.19
120,000	23.26
160,000	24.85
200,000	26.11
400,000	30.33
1,000,000	46.78

0.02 to 0.05 gr/dscf (assuming exhaust gas flow rates of 13,000 to 34,000 dscfm). Some of these standards are based on particulate sampling methods that differ from the EPA technique in that they include material collected in wet impingers. Where such testing methods are specified the impinger particulate catch may account for anywhere from 5 to 50 percent of the total particulate caught in the source testing train.

The opacity regulations of most states apply to all point sources regardless of whether the emission is discharged from a stack. Opacity limitations in some states may apply to fugitive dust sources.

3.3 APPLICABILITY OF STANDARDS

The New Source Performance Standards apply to the three major types of furnaces used in secondary lead smelters and refineries. The standards do not apply to pot furnaces with less than a 550 pound charging capacity but such furnaces should not constitute much of a potential air pollution problem and they will still have to comply with state emission regulations. The standards apply after a new facility has been started up and reached some degree of equilibrium. For the first performance test, the owner must give 30 days advance notice to the Administrator of EPA. The standards are not applicable during startup, shutdown and malfunction since these periods do not constitute

representative operating conditions. However, as will be described later, the owner must report all excess emissions on a quarterly basis. Also the regulations ensure that plant operators properly maintain and operate the affected facility and control equipment between performance tests including the periods of startup, shutdown and unavoidable malfunctions.

One of the more difficult subject areas to determine is the applicability of the standards to existing sources which undergo modification. Under the revised regulations the definition of affected facility is limited to an apparatus to which a standard applies. "Modification" means any physical change in, or change in the method of operation of, an existing facility which increases the amount of any air pollutant (to which a standard applies) emitted into the atmosphere by that facility or which results in the emission of any air pollutant (to which a standard applies) into the atmosphere not previously emitted. The definition of modification and other questions of applicability are fully discussed at 40 FR 58416 (December 16, 1975)(9).

The proper application of opacity regulations is difficult when effluent plumes from sources subject to different opacity regulations are combined. Such a situation will occur with some frequency in the secondary lead smelting industry when existing and new sources, or several different types of new sources are combined to a single control device. To test for opacity and mass emission compliance during a new source performance test it may be necessary to utilize only that percentage of baghouse capacity which a new source will use. At other times, emissions in violation of NSPS opacity regulations but below SIP or applicable local regulations will have to be verified as caused by NSPS covered process or control. Inspection of plant operations records should show which operations were running at the time of the observed emission. On-site inspection may pinpoint poor operating procedure on a NSPS covered source. A finding of poor operation or maintenance is itself a violation of NSPS and may be supporting evidence that a new source has discharged visible emissions to the atmosphere in violation of NSPS emission standards. On-site inspection of control devices and records should indicate whether those devices were maintained and operated at their performance test conditions during a period of possible emission limit violation.

3.4 HAZARDOUS SOURCES

Secondary lead smelters are potential sources of lead, arsenic, cadmium, and antimony. It is anticipated that air emissions of many toxic substances will be controlled in the future under mechanism prescribed by Section 111(d) of the Clean Air Act. Under that mechanism, emissions of a toxic agent from an industrial source category is limited by an emission standard. Concurrently, best available control technology for existing sources is promulgated. States must then develop regulations to control existing sources within the BACT guidelines.

3.0 PROCESS DESCRIPTION, ATMOSPHERIC EMISSIONS, AND EMISSION CONTROL METHODS

At the end of 1971 there were 59 firms operating approximately 45 secondary lead smelting plants in the United States. In addition there were 10 primary lead smelters 3 of which were located in Missouri and the remaining 7 in other states all west of the Mississippi River. Primary and secondary lead production are interdependent upon one another and do compete with one another but annual growth rates have generally trended upward at a yearly rate of about 3 percent. Four of the companies producing lead at secondary smelters account for 75 percent of the total output. The major market for secondary lead is production of lead-acid storage batteries. In some cases, new batteries are manufactured at the same facility as the secondary lead smelter which, in turn, utilizes old car batteries as a source of lead.

The processing of secondary lead centers around the utilization of three furnaces. Smelting operations on the scrap lead are carried out in the blast (cupola) furnace and/or reverberatory furnace and the final purification steps in pot furnaces. The lead-acid storage battery accounts for 83 percent of the scrap lead used by the industry and also provides the major market for the secondary lead produced. Thus, the 3 percent annual increase in consumption of lead-acid storage batteries will result in continued growth of the secondary lead industry.

3.1 PROCESS DESCRIPTION

Raw materials consist primarily of old batteries but other scrap materials may also be received. The scrap is sorted into piles of like materials and foreign matter and impurities are removed. In some cases, rubber or plastic casings of the old batteries are separated from the lead plates by vibrating tables which work on the basis of the relative densities of the lead and rubber. Other raw materials primarily for the blast furnace include coke, limestone, iron, and return slags.

The blast (cupola) furnace used in processing secondary lead is similar to those in the ferrous industry, cylindrically shaped and extends vertically. Forced air, sometimes oxygen enriched, is introduced near the bottom of the furnace through ports called

tuyeres. The furnace is batch fed at the top by some type of car or bucket. A typical charge is made up of about 80 percent scrap lead, generally battery plates, 8 percent coke, 2 percent iron, 10 percent limestone and 8 percent return slags. Heat is produced by the combustion of the coke which also provides an atmosphere for reducing the lead oxide feed. The lead metal collects at the bottom of the furnace and is continually drawn off through a tap hole. The product is "hard" or "antimonial" lead. A slag is formed which floats on top of the molten lead retarding its oxidation and is intermittently tapped off. The furnace is charged often enough to maintain a fairly constant material level in the furnace. A blast furnace that is being fed battery scrap will recover 70 percent of the lead.

Reverberatory furnaces operate by radiating heat from the gas or oil fired burners and the surrounding hot refractory lining onto the contents of the furnace. The flame and products of combustion come in direct contact with the charge material. The furnace is commonly rectangular in shape with a shallow hearth and constructed of fire brick and refractory materials. The principal use of the reverberatory furnace involves the melting and purification of lead by removal of extraneous ingredients. This process is called smelting. The furnace can also be used to melt lead pigs or ingots for casting. In a few cases the furnace might be used as an incinerator to remove combustibles from the scrap lead. Some sweating operations may also be performed, that is, separating lead from other metals in the scrap charge. This is accomplished by taking advantage of the low melting temperature of lead. In some cases, these operations might be carried out sequentially in the same furnace.

The reverberatory furnace may be charged with molten lead from the cupola or a continuous basis. In this case, air is blown through the bath either continuously or intermittently to oxidize metal impurities. The metal dross which is formed floats on top of the lead and is removed intermittently by slagging. The lead product is tapped from the furnace into molds on an intermittent basis. When solid lead scrap, such as battery plates, lead pipe or cable sheathing, is charged directly to the furnace, the charge is normally started by slowly melting an initial amount of solid scrap placed on the hearth. The temperature is slowly raised and as a molten bath is formed, additional scrap is added on a continuous basis. Again, the air blowing and drossing can be intermittent or continuous and casting of product is ordinarily intermittent. If lead oxide drosses are charged to the furnace, a reducing agent such as granular carbon must be added to the bath to reduce the lead oxide to metallic lead. The furnace operates

at about 1500°F principally to allow the reaction between metallic impurities and the oxygen sparged into the bath. The high temperature also allows for afterburning in the furnace proper. This is accomplished by maintaining a tight furnace, that is, excessive air leakage into the furnace is prevented and the amount of oxygen introduced to the furnace is thus controlled. The reverberatory furnace product is a semi-soft lead which is more pure than that which the blast furnace produces.

Pot furnaces are used for remelting and for final alloying and refining processes before pouring into product molds. They are open-top, unsemic lined kettles, hemispherically shaped and generally range in size from 1 to 50 ton capacity. They are normally under-fired by natural gas burners. Refining is a batch operation that can vary from several hours to two or more days, depending on the required final composition. The most common processes employed are for the removal of copper and antimony to produce high purity, soft lead and for the removal of arsenic, copper and nickel to produce hard lead. Dressing agents or alloys are generally added individually and the bath is normally agitated or in some cases air is bubbled through the bath. Dresses are normally skimmed off the surface of the lead by hand. Depending on the particular process being performed, the pot furnace temperature is normally between 600° and 900°F.

For a more complete description of the unit operations of a secondary lead smelter please refer to:

(1) An Outline of Metallurgical Practice (13)
(2) AIME World Symposium on Mining and Metallurgy of Lead and Zinc (17)
(3) Secondary Base Metals Processing Technology (15)

3.2 ATMOSPHERIC EMISSIONS

3.2.1 General

Emissions from secondary lead smelters are primarily particulates. However, a fairly high percentage of sulfur is present as sulfuric acid in the junked batteries so sulfur dioxide and sulfur trioxide concentrations are fairly high in the effluent gases from both the blast and reverberatory furnaces. Generally, the furnaces are fired by natural gas or oil and therefore nitrogen dioxide, hydrocarbons, and carbon monoxide emissions are relatively small. These gaseous emissions from secondary lead smelters are not regulated by the new source performance standards although some state regulations on gaseous emissions might be applicable. For

example, other stack gas regulations could be applicable for limiting sulfur dioxide emissions. Also, carbon monoxide emission limitations could be applicable to blast furnaces where exhaust gases contain large quantities of CO. Hydrocarbon limitations would not be applicable to the furnaces used at secondary lead smelters. The National Emission Standards for Hazardous Air Pollution Sources could be applicable in the future if lead were so regulated. In the interim, some states limit the ambient air concentrations of lead around smelters and other large point sources.

Considering particulate emissions from secondary lead smelters the major sources are the furnaces which are regulated by the NSPS. However, to be complete all industry sources are considered, starting with the raw material handling and preparation. Raw material handling generally does not produce fugitive dust since most of the scrap materials are old batteries and they contain sulfuric acid or oil on their surface. Raw material preparation is minimal and generally involves separating rubber or plastic casings from the lead plates. Slag handling can produce some dust but it generally is in chunks like clinkers or gravel as opposed to fine powder. Furthermore, fuels are piped and the coke contains only minimum amounts of dust.

3.3.1 Blast Furnace

The lead blast furnace produces a hard or antimonial lead. A typical composition for hard lead is 10 percent antimony, 1 percent or less of arsenic and tin, and traces of copper and nickel. Combustion air from the tuyeres passes vertically up through the charge and conveys metal oxides, smoke, bits of coke fuel and other particulates. A typical material balance shows that about 7 percent of the charge is carried out of the blast furnace with the gaseous products of combustion. Stack gas temperatures range from 1200° to 1350°F and contain large quantities of carbon monoxide. An afterburner is normally used to burn the CO and thereby prevent potential explosions in the ductwork or in the baghouse.

Particulate matter loadings in blast furnaces gases are exceedingly heavy but are also highly variable. One Los Angeles test reported 12.3 gr/scf in the untreated effluent from a blast furnace being charged at 2,670 lb/hr. The particulate fume and dust is fairly large ranging in size from 1 to 100 microns; generally the emissions contain dirt, limestone and coke dust plus oxides or sulfides of lead. Discharge points include the stack, charging doors and metal tapping spout. The slag tap is not a major emission point since the slag contains mostly limestone and iron compounds. Blast furnace (cupola) emissions are limited to

20 percent opacity by the NSPS. Emissions will be increased with an increase in slag fines charged to the blast furnace. Emissions will increase with the air blowing rate through the tuyeres. Emissions will increase with the amount of dirt or oil on the lead scrap charged.

3.8.3 Reverberatory Furnace

If a semisoft lead is desired, then refining takes place in the reverberatory furnace. Semisoft lead usually contains about 0.3 percent antimony and up to 0.05 percent copper. The type and condition of the scrap raw materials may affect emission rates. Oily and dirty scrap will create considerably more smoke and particulate emissions. Sweating operations are usually conducted in reverberatory furnaces. Very often material for both sweating and reducing such as lead scrap, battery plates, oxides, dresses, and lead residues are charged to the reverberatory furnace. Obviously, the type and amounts of charged material will have a bearing on the generation of gaseous and particulate emissions which leave the furnace with combustion gases. Smoke and fumes are removed from the furnace by a slight draft which is kept to a minimum so that the maximum heat can be maintained. Particulate emissions are extremely fine (0.3 microns), heavily laden with metal oxides, and have a tendency to agglomerate. Because the furnace is operated near atmospheric pressure to prevent air leaking into the furnace, all doors and ports are hooded to capture emissions that spill out of the furnace. The molten lead pouring spout is generally the only exception. If the draft is too slight compared to the combustion firing rate, then emissions from the doors and ports will become greater than can be handled by the hoods and the excess will bypass the hoods to exit through the roof monitors.

While no reference discussed the flux covers, it would seem from experience with other metal smelting that the thickness of the flux cover would affect volatilization rates of lead and other metals. A thick layer probably is not desirable from the operator's viewpoint since it will reduce the heat transfer to the melt.

3.8.4 Pot Furnaces

Pot type furnaces are used to produce very soft, high purity lead. This soft lead may be designated as corroding, chemical, acid copper, or common desilverized lead and contains over 99.9 percent lead. The refining or alloying consists essentially of adding metal

ingots of a specific metal to the molten lead until specifications are met. Addition of aluminum, for example, reacts with copper, antimony, and nickel to form complex compounds that can be skimmed from the surface of the metal. The only emission point is the open top of the pot which is typically hooded to prevent emission of lead oxide fumes into the work space. In developing the New Source Performance Standards, EPA did not test emissions from any pot furnace but stated that emissions would be much less than from blast or reverberatory furnaces. This is due to the fact that pot furnaces operate at a lower temperature and with less turbulence than blast and reverberatory furnaces. Primary emissions are low and present no unusual control problems. Therefore controlled emissions from pot furnaces should be quite low in terms of visibility and mass.

Further detail on emissions from secondary lead smelters may be obtained from:

(1) Air Pollution Engineering Manual (19)
(2) Source Tests at a Secondary Lead Smelter (14)

3.3 EMISSION CONTROL METHODS

The principal control device used to reduce particulate emissions from secondary lead furnaces is the fabric filter baghouse. In the case of controlling blast furnace emissions, the baghouse is generally preceded by an afterburner which incinerates oily and sticky materials thus avoiding blinding the bag fabric. The high concentration of carbon monoxide, released by the blast furnace, is converted to carbon dioxide by the afterburner. The nature of the reverberatory furnaces allows for this operation to be performed within the furnace. Pot furnace emissions do not require treatment by an afterburner either. Prior to entering the baghouse the hot furnace gases must be passed through some type of cooling facility so that the temperature is compatible with the bag fabric. Another method of controlling furnace emissions that has proven successful is the high energy venturi scrubber. Here prior cooling of the gas is unnecessary. Where battery plates, highly contaminated with sulfuric acid, are the prime source of scrap fed to the furnace, it might be necessary to use a scrubber after the baghouse to remove sulfur dioxide from the exhaust gas. The dry collection of the metal oxide dust in the baghouse lends itself to simple recycling of the valuable product, as opposed to the many steps necessary to retrieve the product from the scrubber catch. (Example equipment arrangements are shown in Figures 3.1, 3.2, and 3.3.)

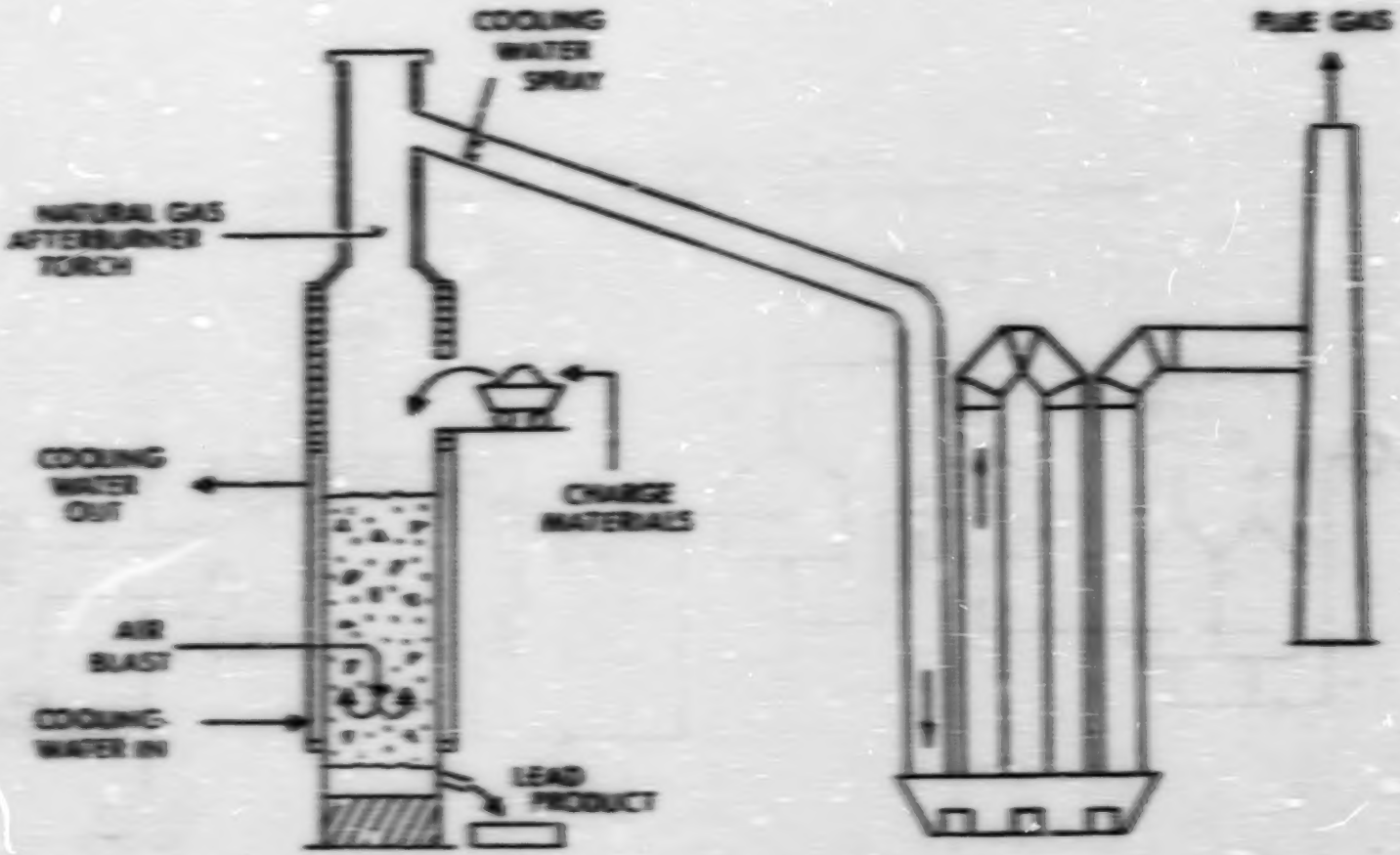

Figure 3.1 Process flow sketch of lead blast furnace or cupola with cooling system

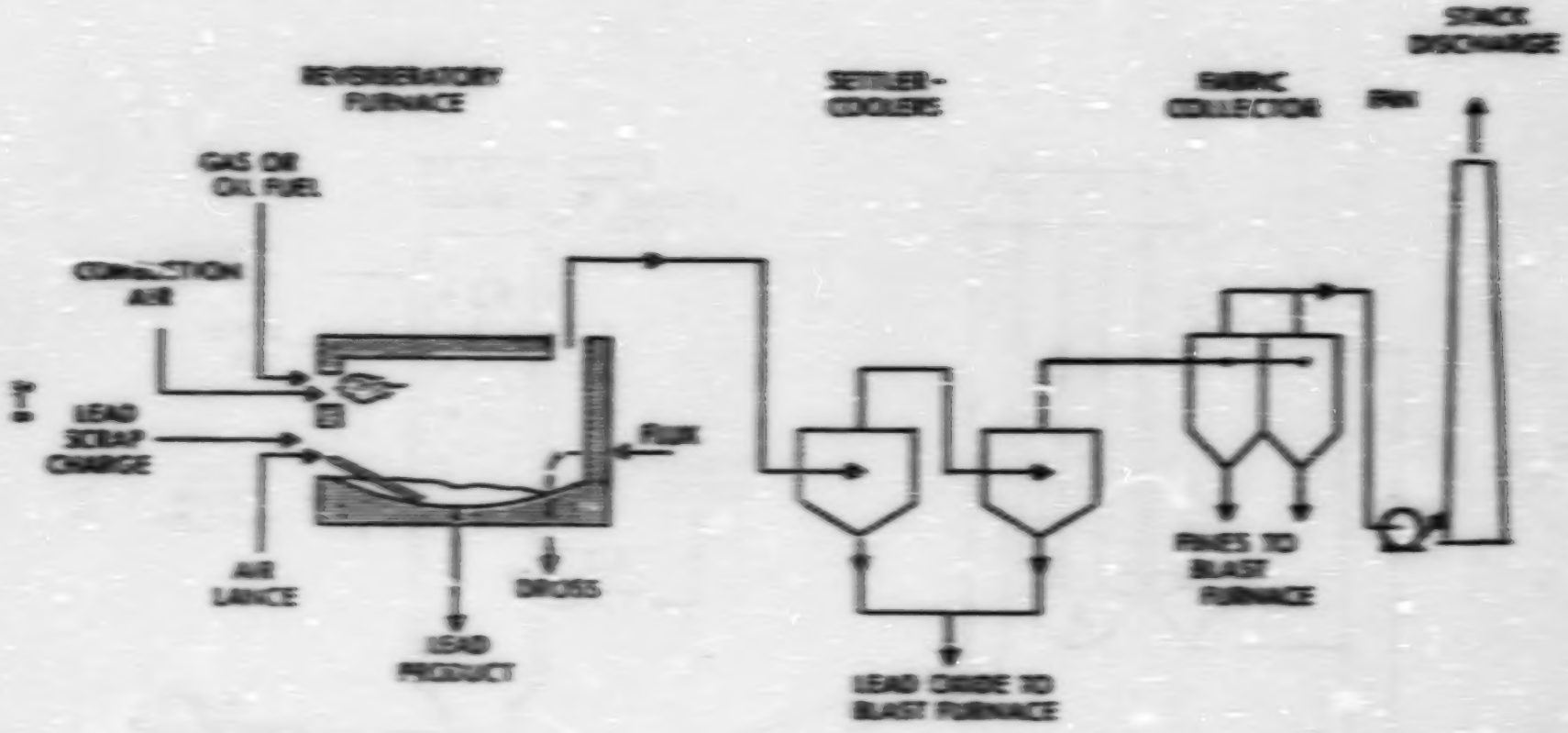

Figure 3.2 Process flow sketch of lead reverberatory furnace with fabric collector

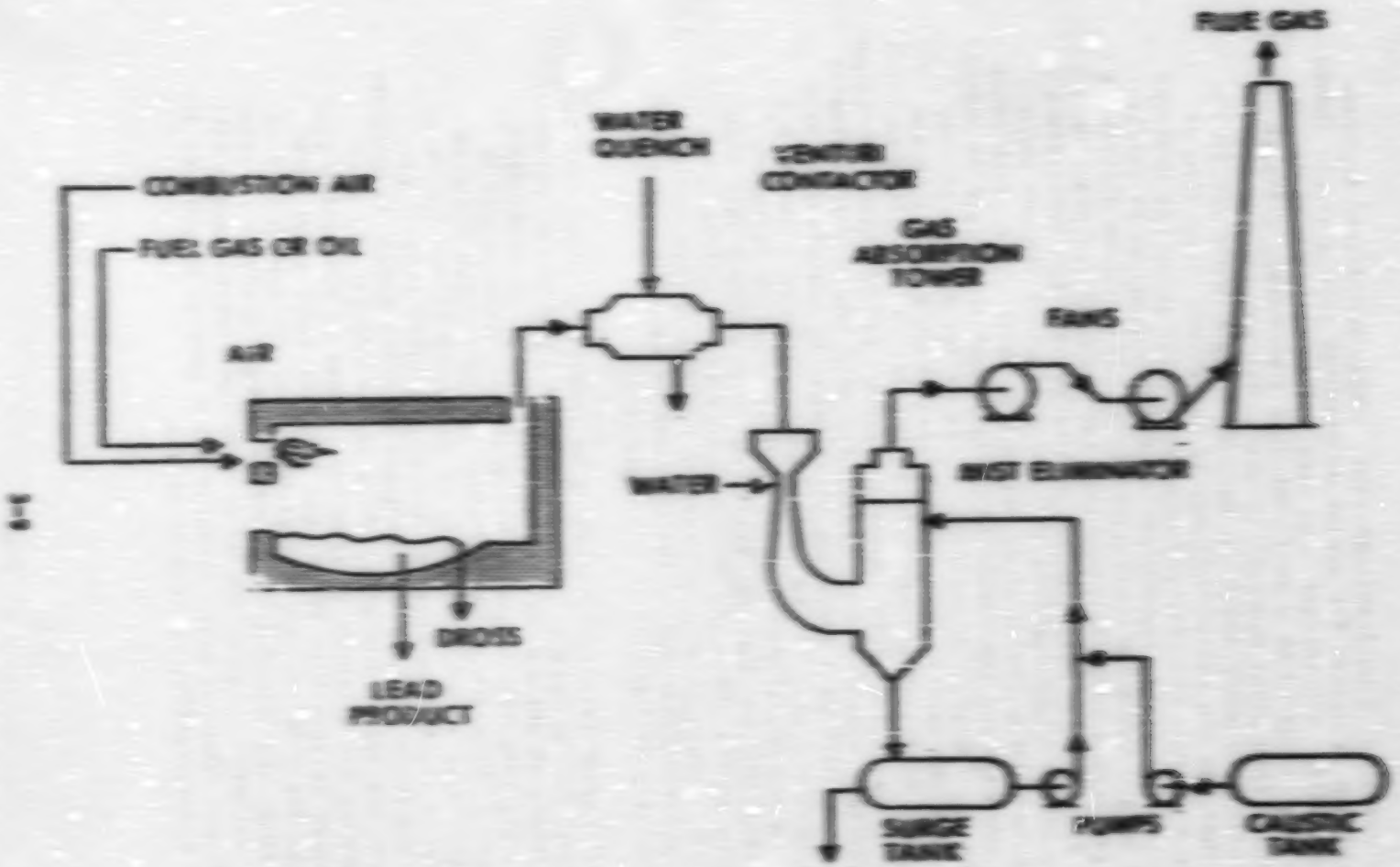

Figure 3.1 Process flow sketch for lead smelteries burning with air emission

Most commonly, a pull-through type, compartmentalized baghouse is used because it allows for easier maintenance than a single chamber house. Generally, the tubular bags used are constructed of dacron, which has been found to be a good cost/life compromise, although in some cases fiberglass material is used. The gas temperature must be reduced to about 300°F for dacron or about 500°F for fiberglass so that the bag fabric will not be destroyed. Some type of cooling duct system, commonly preceded by a water spray, is employed to obtain the necessary temperature reduction. Also, it is fairly common to have a thermally controlled damper which allows dilution air into the gas stream prior to entry into the baghouse for additional cooling. The operator must also be careful to keep the temperature of the gas entering the baghouse at least 50°F above the dew point of the gas to prevent condensation within the unit. This would cause caking on the bags and the resulting pressure build-up would ultimately rupture the bag fabric. In addition to the water, acids will also be formed from the sulfur, etc., in the gas, causing damage to the bag fabric and corrosion to the house structure. A gas volume to cloth area ratio of up to 2 to 1 is commonly employed for efficient operation of the collection system. Most likely, the only monitoring instrument on the baghouse will be a manometer which measures the pressure drop across the entire system. This will commonly range up to 4 in. H_2O gauge. It is economically unwise for a plant to allow excessive amounts of dilution air into the system or to maintain a very high pressure drop across the bags. The manometer will indicate a bag rupture by the resulting drop in pressure but the obvious increase in visible emissions emitted by the baghouse is the more common method of establishing a malfunction in the baghouse.

Venturi scrubbers are not utilized as commonly as baghouses in the secondary lead industry. Depending on the application, scrubbers can vary between 30 and 100 in. H_2O pressure drop. In some cases, the furnace gas temperature has to be reduced by water sprays to prevent adverse operation of the scrubber. A 60 in. H_2O pressure drop corresponds to a throat velocity of about 300 ft/sec and water requirements of about 3 gallons per minute per 1,000 acfm of gas. Almost all scrubbers will have a manometer or other gauges to indicate the pressure drop across the unit. To a lesser degree, the water flow rate within the scrubber is important. Some modern plants will have monitoring systems that record the pressure drop, water flow rate, and the gas flow rate to the scrubber. If PVC coated wire or battery housings are included in the scrap charge, hydrogen chloride gas will be released. Teflon coated wire in the furnace charge will release hydrogen fluoride gas. Normally these gaseous components are at very low concentration, if present at all.

No electrostatic precipitators have been utilized to control secondary lead smelters emissions probably because of the small gas volumes and the resistivity of the lead oxide particles.

The Environmental Protection Agency observed 11 well controlled secondary lead smelters. Visible emissions at the plants were all less than 10 percent opacity. Stack testing was conducted on three reverberatory furnaces and two blast furnaces. The blast furnaces were controlled by (1) an afterburner and baghouse; (2) an afterburner, baghouse, and venturi scrubber, and (3) a venturi scrubber. Particulate emissions averaged 0.003, 0.009, and 0.015 gr/dscf. The reverberatory furnaces were controlled by baghouses with particulate emissions averaging 0.004 gr/dscf in both cases. No visible emissions were noted in three of the furnaces tested. Two furnaces had visible emissions of 15 percent opacity or less.

Earlier the Los Angeles County Air Pollution Control District (APCD) tested three blast furnaces and one reverberatory furnace. The blast furnaces were controlled with afterburners and baghouses; the reverberatory furnace was controlled by a baghouse. Emissions averaged respectively 0.001, 0.005, 0.013, and 0.003 gr/dscf.

It is common practice in the industry to manifold the exhaust from several furnaces into a common control system thus achieving some economy of scale. Also it is common and necessary to cool the exhaust gases from the furnaces prior to entering the fabric filter. This is accomplished by use of radiation cooling, water sprays, and/or air dilution. Since the fan on the end of the system pulls a fairly constant gas volume the success of the system depends on the radiation and water spray cooling to eliminate the need for excessive air dilution cooling directly ahead of the fabric filter. If this damper opens, the bags are protected but the collection efficiency of the hoods over the furnace will be diminished. Obviously the grain loading going out of the bags will be low but more of the metal fume will be escaping the hoods and discharging to the atmosphere through the plant's roof monitors.

Further detail on air pollution control equipment applications on secondary lead smelters can be obtained from:

(1) Air Pollution Engineering Manual (15)
(2) Background Information for Proposed New Source Performance Standards (3)
(3) Proceedings - The Uses and Fabric Filtration Equipment Specialty Conference (16)
(4) Sources of Air Pollution and Their Control (18)

(5) Study of Technical and Cost Information for Gas Cleaning Equipment in the Lime and Secondary Non-Ferrous Metallurgical Industries (12)
(6) Control of Metallurgical and Mineral Dusts and Fumes in Los Angeles County (1)
(7) Control Techniques for Particulate Air Pollutants (8)

4.0 MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS

4.1 MONITORING THE PROCESS, CONTROL DEVICE, AND EMISSIONS

One purpose of monitoring operations and maintenance of the furnaces at secondary smelters is to ensure that the compliance determined by performance tests is maintained on a continuing basis by proper operation and maintenance of all equipment.

From an air pollution control viewpoint, the major problems associated with secondary lead smelting are efficient capture of particulate matter generated by the furnaces and subsequent removal of the particulate by abatement equipment. It has been positively shown that with current air pollution control technology, particulate emissions from these plants can be reduced to meet all applicable Federal and state emission standards. Thus assuming proper design of the abatement system, the problem becomes one of proper maintenance and use of the equipment.

At the present time, new source performance standards for new or modified secondary lead smelters do not require any monitoring equipment on the processes, on the control equipment, or on the emissions discharged to the atmosphere. However, either specific or general monitoring requirements may be in effect under certain State Implementation Plans, although again, EPA has not promulgated any minimum requirements for secondary lead smelters.

4.2 RECORDKEEPING

Since automatic monitoring is not presently required for secondary lead smelters, recordkeeping on a routine basis becomes extremely important to provide a method for the air pollution control officer to determine that operating and maintenance practices are consistent with reasonable air pollution control needs. Records should be kept on production processes, on control equipment and on emissions. Each of these parameters are described separately although obviously there are interrelationships.

Also, it should be clear that the suggested recordkeeping is not now required by the NSPS and probably not by any of the state agencies. Section 114(a)(ii) of the Clean Air Act, as amended, provides that the Administrator may require the owner or operator of any source to provide information for the purpose of

determining "whether any person is in violation of any such standard or any requirement of such a plan." This is one of the most important enforcement tools under the Clean Air Act, in that the source can be required to provide the information which may be the basis for later enforcement by EPA.

The facility operator should maintain a description (tabulation and schematic diagrams) of the plant identifying major equipment items, types of furnaces, and controls used for the smelting operations. Within a secondary lead smelter there are at least three different types of furnaces. However, the types of records that should be maintained are similar. On each furnace, the following information should be recorded and very likely will be available in the Company's records for each heat or batch:

(1) Process or charge weight rate and quantity of ingots or product produced, to nearest ton;
(2) Specification of the ingots or product;
(3) Date and time heat began and ended, to nearest hour;
(4) Fuel consumption, to nearest 100 cubic feet or 10 gallons;
(5) Oxygen consumption, to nearest 100 cubic feet;
(6) Compressed air consumption, to nearest 100 cubic feet;
(7) Flux identification by constituents and consumption, to nearest 100 pounds;
(8) Slag handling process and H_2S emission control;
(9) Gas flow system data; power requirements, exhaust flow rate;
(10) Malfunctions;
(11) Operating deviations for above items.

The purpose of recording the above process data is to be able to compare the batch or heat production cycle with the production at the time of the performance test. The emission rate for a given ingot specification will increase if the heat is produced quicker by using more fuel, more oxygen, more compressed air, etc. Also, the capture efficiency of the hoods would probably decrease as production rates increased above the performance tested production rate. Since the blast furnace (cupola) operation is continuous the above information should be recorded at the end of each shift or three times daily.

The exhaust gas collection, venting, and emission control system should be described (diagramed) in detail. The sequence of controls, types of controls (afterburners, cooling systems,

PM collectors, baghouses, filter types) should be outlined and described using quantitative parameters. For each control component or system checkpoints the respective information recorded, at the intervals indicated, should include:

(1) Quantity of collected dust and fume, by month to nearest ton;
(2) Volumetric flow on inlet to collector, on first of each month;
(3) Volumetric flow on outlet from collector, on first of each month;
(4) Pressure drop across each section of the collector after cleaning, on first of each month;
(5) Static pressure from fan through collector, gas cooling system and ductwork to collecting hood, on first of each month;
(6) Fan speed, on first of each month;
(7) Capture velocity on hood faces, on first of each month;
(8) Excess air data for gas exhaust system, and results of any Monoxor (CO detector) and Fyrite (CO_2 detector) analyser surveys;
(9) Inspections, maintenance and repairs, by month;
(10) Malfunctions, by month.

The purpose of having the above information kept on the air pollution control system is to ensure that air contaminants generated by the furnaces will be collected by the baghouse or other collection system the same as when the performance tests were conducted. The quantity of dust collected should remain proportional to the production of furnaces hooked to the system. The volumetric flow measurement on the inlet and outlet will indicate leaks in the baghouse. Pressure drop after cleaning will indicate if the bags are becoming badly worn or blinded by dust. Static pressure measurements will indicate leaks in ductwork or ductwork filled with dust. Capture velocity at the hoods will indicate if the capture efficiency is changing.

For the emissions, the owners or operator should not record visual opacity unless the observer has been certified by EPA or a state agency to make such opacity observations. The plant operator should record and report complaints and should indicate the probable cause of the problem.

4.3 REPORTING REQUIREMENTS

The EPA reporting requirements suggest that the owner or operator of a source subject to continuous monitoring and recording requirements should summarize such measurements monthly and should submit such summaries to the state on a quarterly or

more frequent basis. As will be described later, the Federal requirement for new facilities to report startup, malfunction or shutdown is on a quarterly basis. Therefore, it seems logical and consistent to suggest the above records also be summarized on a monthly basis and submitted to the state quarterly.

Also, the NSPS regulation requires owners and operators to maintain a file of all recorded information required by the regulations for at least two years after the dates of such information.

Suggestions for formats and contents of recordkeeping tables are indicated in Tables 6.1, 6.2, and 6.3 at the end of section 6.0.

For further detail on monitoring, record keeping, and reporting requirements, please refer to:

(1) Federal Register, October 6, 1975, page 46240 (8);
(2) Federal Register, October 6, 1975, page 46250 (a); and
(3) Guideline for the Selection and Operation of A Continuous Monitoring System for Continuous Emissions (11).

5.0 START'P, SHUTDOWN, AND MALFUNCTIONS

The Code of Federal Regulations, Title 40, Part 60, addresses the problem of startup, shutdown, and malfunctions. Section 60.11 (d) states, in part, "at all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions." As another part, Section 60.7 states, "A written report of excess emissions as defined in applicable subparts shall be submitted by each owner or operator for each calendar quarter. The report shall include the magnitude of excess emissions as measured by the required monitoring equipment reduced to the units of the applicable standard, the date, and time of commencement and completion of each period of excess emissions. Periods of excess emissions due to startup, shutdown, and malfunction shall be specifically identified. The nature and cause of any malfunction (if known), the corrective action taken, or preventive measures adopted shall be reported. Each quarterly report is due by the 30th day following the end of the calendar quarter. Reports are not required for any quarter unless there have been periods of excess emissions. (Suggestions for format and content of recordkeeping on startup and shutdown operations and malfunctions are indicated in Table 6.3 at the end of section 6.0.)

The above provisions presently apply only to three furnace types at new secondary lead smelters. However, the state agencies may well adopt similar requirements and, in fact, some states already require existing plant upset conditions to be reported. The principal difference, however, may be in EPA's definition of malfunction which exclude several common causes of excessive emissions. The wording is as follows: "Malfunction means any sudden and unavoidable failure of air pollution control equipment or process equipment or of a process to operate in a normal or usual manner. Failures that are caused entirely or in part by poor maintenance, careless operation, or any other preventable upset condition or preventable equipment breakdown shall not be considered malfunctions."

5.1 STARTUP

Startup operations are common practice, occurring daily, in the secondary lead industry. Since the pot furnaces are batch operations, startup of these furnaces poses no particular problem from the emission point of view. When a furnace is being heated up, only fuel is being burned. A blast furnace which is a continuous operation starts by heating up the furnace and it typically takes about four hours to reach normal operating conditions. The reverberatory furnace is a continuous operation also but it may be somewhat cyclic depending on the rate of scrap addition and the rate of lead draw-off.

5.2 SHUTDOWN

Shutdown of the furnaces can be more of a problem than startup, however, since several tons of molten metal cannot be allowed to solidify in any of the furnaces. In the event of a malfunction or failure in the control equipment (baghouse or scrubber), the furnace must be vented to the atmosphere for the remainder of the heat cycle or until the furnace can be prepared or stoked for holding. It is not desirable to allow the firebrick to become completely cold since damage to the firebrick may occur with frequent or extreme temperature changes.

5.3 MALFUNCTIONS

Concentrating then on malfunctions that could cause excessive emissions, two types of malfunctions may be considered. The first category is made up of those conditions which would create excessive emissions into the workspace with subsequent discharge through the roof monitors to the atmosphere. Such a condition would very likely be manifested by insufficient draft on the collection hoods which could be due to:

(1) slippage on fan belts
(2) high pressure drop in the baghouse which in turn may be due to:

- improper compressed air supply
- improper timer operation
- improper solenoid valve operation
- leaky airlock or dust discharge valve
- moisture blinded bags
- dust in clean air plenum
- static electricity
- incorrectly installed blow tubes
- collector overloaded from too much air

(3) fan rotating in the wrong direction
(4) leaking ductwork, access doors, explosion doors or discharge valve on air lock
(5) clogged ductwork or faulty damper
(6) duct size improper
(7) high temperatures and increased gas volumes of the exhaust gases which would cause the atmospheric damper to be opened excessively. This condition in turn could be caused by:

- addition of large amounts of a low boiling point alloy to the pot furnace charge;
- addition to the blast or reverberatory furnace charge of scrap with large amounts of oil or other combustibles;
- blowing the molten bath of the blast furnace at too high a rate with compressed air;
- firing at excessive rates;
- hardened slag cover in the reverberatory furnace;
- slips in the blast furnace following bridging.

The second category of malfunctions would result from control equipment failures. The more important examples would include:

(1) short bag life with frequent failures (ruptures) which in turn could be due to

- high operating temperatures
- low dew point gas conditions with condensation of SO_3 and SO_3
- acidic or basic dust that attacks fabric
- a high filtering velocity or air to cloth ratio with excessive bag shaking
- dust in clean air plenum from previous bag failures or from bridging of dust in the hopper cleanout

(2) motor failure
(3) fan unbalanced due to particulate buildup
(4) pump failure
(5) clogged or worn nozzles
(6) poor water distribution due to buildup of mud

For further information on baghouse design, operation, and maintenance, please refer to the following reference materials:

(1) Appendices to Handbook of Fabric Filter Technology (2)
(2) Proceedings-The User and Fabric Filtration Equipment Specialty Conference (15)
(3) Air Pollution Engineering Manual (19)
(4) Systems Study of Scrubbers (4)

6.0 INSPECTION PROCEDURES

6.1 CONDUCT OF INSPECTION

Before an air pollution inspector visits a facility, it is necessary to establish the objectives of the inspection. In this regard, he may wish to check with his administrative, legal, or engineering advisors prior to the inspection since some or all of the following objectives may be important for a given plant inspection:

(1) Determine the scope of the facility's operation.
(2) Determine the applicability of standards.
(3) Inspect records and/or monitoring equipment.
(4) Evaluate visible emissions (Test Method 9).
(5) Determine if a stack test is required.
(6) Conduct or observe stack tests or other field tests.
(7) Evaluate maintenance and operation of equipment.
(8) Establish compliance or non-compliance with compliance schedules.
(9) Investigate feasibility of various control methods.
(10) Investigate compliance with emergency episode plans.

Section 114(a)(2) of the Clean Air Act enables the Administrator or his authorized representative to enter a source so that EPA can do its own monitoring, sampling, inspecting, or copying of records. Such authority may be delegated to a state and be exercised by a state official.

In preparing for the inspection, the control official should:

(1) Review the literature on the subject industry's process descriptions, inspection points, and control equipment.
(2) Review the NEDS file or other plant file for details of processes and control equipment in use including plot plan.
(3) Review applicable standards (Federal, state and local).
(4) Review enforcement history on the plant.
    - administrative and court actions
    - compliance schedules
    - monitoring and recordkeeping requirements

- previous inspections
- section 113 abatement actions
- waivers, notifications, quarterly reports, registration (NSPS and NESHAPS)

(5) Finalize objectives

(6) If appropriate provide advance notice

(7) Obtain credentials and business cards (EPA has a procedure regarding the issuance and control of credentials)

(8) If desired, obtain for handout a supply of applicable statutes and regulatory authority as well as EPA or state literature explaining the enforcement program

(9) Obtain or develop a supply of inspection checklists.

(10) Obtain personal safety equipment. (A source owner or operator has no responsibility to supply EPA inspectors with safety equipment.)

- hard hat
- safety glasses or goggles
- steel-toed shoes
- respirator
- gloves
- coveralls

(11) Obtain necessary inspection equipment

- tape measure
- flashlight
- thermometer and gauge
- manometer (flex-tube)
- inclined monometer
- RPM indicator
- velometer
- camera
- Fyrite combustion analyser - O_2, CO, CO_2
- smoke spot analyser

6.2 INSPECTION CHECKLIST

After preparing for the inspection by reading appropriate information and obtaining necessary equipment, the control official is ready for the actual site visit. Before entering the plant property it is desirable to observe the stacks and roof monitors for evidence of visible emissions. If a plume is consistently visible, opacity observations should be recorded for possible violation. Time should be allowed for such observations prior to the appointment.

At the plant entrance, present credentials and request to see the most senior or responsible official of the company. Generally this person will be the plant manager. The control officials should not sign the waiver forms or "visitor releases". The inspector has specific legal authority (Federal or state) for right of entry and signing such forms may adversely affect his Federal or state insurance or survivors benefits. If a source persists in its refusal, the matter should be carried to court. If a source simply refuses right of entry, a request must be made through a U.S. attorney for a search warrant.

Upon meeting the plant manager, the inspector may be questioned on the following items and should be prepared to discuss:

(1) The purpose of the inspection (NSPS, SIP, NESHAPS).
(2) The authority for the inspection (113, 114, State law, etc.).
(3) The agency's organization and responsibilities.
(4) Recent history of legislative and enforcement activity affecting the subject industry and specific plant.
(5) The scope, timing, and organization of the inspection.
(6) Information and records to be examined (self incrimination-see Appendix).
(7) The treatment of confidential data (trade secrets-see appendix).
(8) Possible measurements to be made.
(9) Possible follow-up activity.

- future inspections
- section 113 or 114 letter
- stack tests
- notice of violation

After the preliminaries are completed, the control official should request the name, title and address of the most appropriate company officer for official contact on future inspections and correspondence.

Next, he should request a brief summary of the plant's production facilities and air pollution control equipment. This information will substantiate the NEDS or other emission source data that the agency has on file or will provide the basis for updating or correcting such files.

The company official should be asked to indicate which processes, unit operations, furnaces, and control equipment are (at the time of the discussion) operating at or near normal operating conditions. Likewise, the company official should be

asked to indicate which facilities are not operating at or near normal operating conditions and to indicate the reasons and the timing (date and hour) for shutdown or malfunctioning equipment. The schedule for returning shutdown equipment to operation should be indicated. The malfunctioning equipment should be shutdown if such malfunctioning adversely affects emission rates to the atmosphere and the schedule for shutdown and correction should be indicated.

Next, the inspector should request a quick rather cursory tour of the plant facilities and the company official should point out all of the sources and control equipment indicated earlier. Access to the roof and to the stacks should be requested and visual observations should be made of hood capture efficiencies, stack effluents, sampling ports and platforms, ductwork conditions, and general housekeeping in and around the plant. Evidence of dust or fume accumulation on the plant roof or at the stack exit should be noted. During this tour the inspector should note whether the process, furnace, etc. is running and whether its operation warrants more detailed analysis.

After getting acquainted with the plant and its facilities, the inspector should request that the company official provide information from his records that will allow the inspector to complete the process, control equipment and malfunction record forms which are appended. Records for the complete calendar month prior to the visit will generally suffice to give a baseline of the plant's operations. With such information, comparisons can be made with future operations, with past performance test and design operating conditions, and with operations at the time of the current inspection. In the event the company identified certain data as confidential, a company official must make a request for such confidentiality in writing to EPA.

Next, the control official should request the company official's assistance in verifying the real-time operating conditions and actual production rate of each process, furnace, etc. in the plant. This plant inspection may take several hours and the records or data which the official sites--weights, fuel flow measurements, temperatures, etc.--should be seen and verified by the air pollution inspector. After verifying that certain equipment is operating, the inspector should be prepared to take his own data on fan speeds, gas velocity and duct flow rates, static pressure, pressure drops, hood capture velocities, and temperatures (both dry bulb and wet bulb). On equipment that is not operating, especially baghouses or other control equipment, the opportunity should be taken to open access doors to check ductwork, fabric bags, clean air plenum,

valves and dampers, fan drive belts, collection hoppers, etc. The inspector should take note of those conditions cited in Chapter 5.0 which can lead to malfunctions and check the equipment accordingly.

6.3 INSPECTION FOLLOW-UP PROCEDURES

Upon completion of the inspection, the inspector should sign and date all notes and inspection forms making certain that all blanks are completed. He should advise the company official that he will review his findings with his legal and technical advisors prior to making recommendations for any necessary action. The inspector should not advise the company official of specific violations. The conclusion of all inspections will be: (1) affected facilities are in violation of standards; (2) affected facilities are in compliance with standards; or (3) affected facilities are not being operated or maintained precisely in accordance with the performance tests but violations are not clearly evident. Where operating conditions have a high probability of producing greater emissions than those recorded during the performance tests, a new performance test may be required of the source by the Administrator. Also, poor maintenance and housekeeping is a violation of NSPS regulation 60.11(d).

In the first case for new secondary lead smelters subject to the NSPS, the only violations which could be cited at the present time under Section 111 are opacity violations or failure to record or report malfunctions. The mass loading limitation on blast or reverberatory furnaces could not be determined without isokinetic particulate tests. In the case of existing facilities, state opacity limitations or reporting requirements for upset conditions would seem to be the only possible violations. Obviously, the agency whose regulation is being violated should be advised.

In the second case, the plant will be found to be operating and maintaining its facilities in a manner consistent with good air pollution control practice for minimizing emissions. Also the affected facilities will be found to be operating essentially at the production rates and under the conditions recorded at the time of the performance tests.

In the third case, which will be the most common and the most difficult, inspections will be concluded with a need for recommendations to improve specific operating or maintenance procedures so as to be consistent with the performance test conditions and with good air pollution control practice for minimizing emissions. If such recommendations are not followed and the inspector feels that emissions may be excessive, a performance test would be required to substantiate or refute compliance with the regulations. On the matter of what conditions constitute a significant deviation

as to require a new performance test, the inspector should not make a decision in the field. Instead he should record field data from which technical and legal advisors can draw such a conclusion.

Regardless of the findings, the designated company officer should be notified in writing of the inspection results and any required action on the company's part should be spelled out in detail with a time schedule to bring the facilities back into compliance. Section 113 of the Act should be cited. At the conclusion of the designated time period for compliance, a followup inspection should be made to verify conformance with the recommendations and applicable standards.

For further information on inspection procedures refer to:

(1) Field Surveillance and Enforcement Guide for Primary Metallurgical Industries (10)
(2) Workshop on Stationary Source Inspections (21)
(3) Air Pollution Control Field Operations Manual (23)
(4) 512.-General Policy on the Use of Section 114 Authority for Enforcement Purposes (Appendix)

Table 4.1 [illegible]

Part I – Process Data

[illegible]: _____

[illegible]: _____

[illegible]: _____

[illegible]: _____

[illegible]: _____

[illegible]: _____

[illegible]: _____

[illegible]: _____

[illegible]: _____

[illegible]: _____

| [illegible] | | |

Table 6.2 [illegible]

Part II – [illegible]

Company

Street Address

City State

Official Providing Information

Title of Official

/

Report for Period Year

[illegible]

[illegible]

[illegible]

[illegible]

Persons employed or desired in this control equipment

Quantity of dust collected ton

Gas flow rate @ collector inlet cfm

Gas flow rate @ collector outlet cfm

Temperature @ collector inlet °F

Temperature @ collector outlet °F

Static pressure in collection system

stack	"wg
before fan	"wg
collector outlet	"wg
collector inlet	"wg
between collector sections	"wg
before water sprays	"wg
dust silos load	"wg

Fan speed rpm

Capture velocity of hoods

near furnace	fpm
charging doors	fpm
pouring spout	fpm

Pressure drop across each section of clean collector 1 2 3 4

Remarks concerning inspections, maintenance and repairs

Date Inspector

Table 6.3 [redacted]

Part III – Stamps, Seizures, and Malfunction

[redacted]

[redacted]

7.0 PERFORMANCE TEST

The Code of Federal Regulations, Title 40, Part 60 provide in Section 60.8 for performance tests of new secondary lead smelters. The test calls for three separate runs using standard EPA test methods and procedures. The Administrator, however, can modify the testing requirement; he can even waive it. If tests are to be conducted, the owner or operator must give EPA 30 days notice. EPA must then specify the operating conditions of the tested furnace. At present, only new reverberatory and blast furnaces have a mass emission rate which requires performance testing; pot furnaces have only an opacity standard. At the time of the test, the inspector should be present to observe process and control device operation so that subsequent inspections can be correlated with the performance test "baseline" operating conditions. Also at the time of the tests, the inspector should check certain of the source testing procedures to ensure that the tests are conducted properly. Each of these three requirements is considered separately in the ensuing discussion.

7.1 PROCESS OPERATING CONDITIONS

The purpose of the performance test is to determine whether the emission standards will be met when the furnace is operating at normally encountered conditions that create the maximum emission rate. The operating conditions that should be specified for the tests are as follows:

(1) The production rate should be the maximum rated capacity of the furnace;
(2) The period of the heat should be the minimum possible to achieve the specification of the melt;
(3) The specification of the lead ingots or product (alloy) to be produced should be typical of the product produced by the affected facility to be tested;
(4) If oxygen is used at all, the consumption rate should be the maximum rate anticipated;
(5) If compressed air is used at all, the consumption rate should be the maximum rate anticipated;
(6) The fuel consumption rate should be the maximum rate anticipated;

(7) The flux addition rate should provide a slag and flux cover depth typical of the operation to be tested;
(8) The pouring temperature should be the maximum anticipated for the metal alloy being produced.

7.2 PROCESS OBSERVATIONS

For the pot furnaces the most important process observation is the amount, time period, and type of alloy or flux added to the molten lead. Since it is a batch-type operation, the only significant emissions will occur during this period. During the alloy addition observation should be made of the capture efficiency of the hood over the top of the pot furnace.

For the reverberatory furnace, the first major observation is whether the tested conditions are for batch-type or continuous operation of the furnace. If it is to be operated on a continuous basis, then observations should ensure that charging, heating, fluxing, and tapping are, in fact, fairly uniform and that the furnace has reached a normal operating level near design capacity. These same observations should be noted on a blast furnace since it also is a continuous operation.

If the reverberatory furnace is to be operated on a batch-type basis, it will require several hours to produce a heat of lead. In this case, care needs to be exercised to source test during periods which produce maximum emission rates. Also different phases of the heat should be covered by the testing to ensure compliance over the entire heat.

Some of the observations that should be noted during the testing and in between the tests are described below for blast furnaces and for reverberatory furnaces (both batch and continuous) since the method of operating can affect emission rates.

The method of charging is important. If essentially all of the charge is added at the beginning of the heat, emissions will be lower than if material is subsequently or intermittently charged to a hot operating furnace. If subsequent charging is practiced, emissions will be reduced if the fuel rate is decreased or stopped while charging.

The amount of the total charge will have some effect on emissions. However, the production rate, quality and method of charge, charging rate, fuel rate, oxygen rate, and slag cover are probably more closely related to emissions than total charge.

The duration of the heat is important in that the quantity of impurities to be removed from the old batteries and other scrap remains constant regardless of the duration of the heat. There is effective dilution and lowering of the grain loading with longer than normal refining times.

The approximate lead content of the scrap which is charged should be noted and the lead content of the ingots should be noted. If the charge is high in impurities and the final product is very low in impurities, then more refining will be necessary to remove impurities and most of this material will go to the baghouse.

The oxygen, compressed air, and fuel consumption rates all relate to the speed with which the impurities in the molten metal are removed. If the rates are low and the time longer, emission rates will be less than if the rates are high and the time shorter. If the source test is conducted for only one hour or so, care should be exercised to include representative smelting conditions.

The thickness of the slag cover may be important since the slag cover reduces the loss of lead due to oxidation. A thick layer may harden and cause excessive lead oxide emissions. Until the slag layer hardens, however, a thicker layer than normal during a performance test will reduce mass emissions and increase the quantity of heat needed, thus giving a lower grain loading during the performance test.

If the pouring temperature is higher than necessary, the fume emission will be increased.

If a baghouse is the selected control equipment, it may be designed to meet the standard with one section off line for cleaning. If this is the case, the testing may be desirable with one section dampened off.

Also, since it is common practice to vent two or more furnaces to the same baghouse, it may be necessary to operate other equipment simultaneously or to bypass a portion of the baghouse and a portion of the production equipment to try to get air to cloth ratio and inlet grain loading that will be experienced under normal operating conditions of the blast or reverberatory furnaces. Whatever final procedure is determined for operating the control equipment, the control official should note all conditions and should complete the Inspection Checklist Forms relating to the control equipment.

7.3 EMISSION TEST OBSERVATIONS

Emission tests and opacity determinations should be conducted by qualified emission testing personnel. The inspector is responsible for ensuring that all pertinent data are collected, that the field procedures and equipment meets CFR, and that the emitter is run at representative performance during all sampling runs. A qualified technician or engineer reads visible emissions during the three particulate runs. The approved visible emission data form appears in Appendix B.

The inspector's degree of surveillance of the stack sampling team depends on the confidence of the inspector and qualifications of the test personnel. Even if the inspector has complete trust in the sampling crew, the following tasks should always be performed:

(1) Record duct dimensions (both inside and outside) and locations of sample ports.
(2) Check the number of ports at the sampling site and examine the ducting for the nearest upstream and downstream obstructions. Ask the crew leader how many total points will be traversed and check with Figure 1.1 in 40 CFR 60 to determine whether the stream will be properly sampled.
(3) Note whether the crew runs a preliminary traverse, and if so, inquire what nozzle diameter is selected. (Isokinetic sampling is a function of nozzle size.)
(4) Check to ensure that the moisture content of the gas stream is determined by Method 4 or an equivalent method such as drying tubes or volumetric condensers; assumption of the moisture content is not allowed. Note, however, that EPA has proposed a method for the estimation of the moisture content for the purpose of determining isokinetic sampling rate settings. The proposed method appears at 41 FR 23060 (June 8, 1976).
(5) Observe the leak test of the sampling train. The allowable leak rate is given in Method 5. Leakage results in lower concentrations than are actually present. Be near the dry gas meter during the leak check, note whether the meter hand is moving. (The more the hand is moving, the greater the leakage.) Leak checks must be made if the train is disassembled during the run to change a filter or to replace any component.
(6) Record dry gas meter reading before and after test.
(7) Record average velocity head and temperatures in duct during test.

(8) If impingers are used during test, observe whether they are bubbling. If they are not, the sampling train is either plugged or disconnected from the pump.

(9) Check the cleaning procedure for the front half of the train. Careless removal of filters or cleaning of probes will result in lower calculated emissions. Look for broken glass from probes or connectors. Test is void if glass probe is broken during test. If glass connectors are broken in transport from sampling site to clean-up area, test is still valid. Be sure identification labels are properly attached to collection containers. The probe should be brushed and rinsed with acetone thoroughly to remove all particulates. The probe should be visually inspected after cleaning to ascertain that all particulates have been removed.

(10) Observe gas analysis procedure for determining CO_2. Technician should take at least three samples before averaging readings. Variations greater than 0.3 percent (grab sample) or 0.2 percent (integrated sample) indicate gas mixture was not thoroughly bubbled in reagents. Ask technician or crew leader when new reagents were added to apparatus.

(11) Check percent isokinetic.

(12) Inquire about the calibration history of the flow volume recorder. The flow measuring device is required to maintain an accuracy of ±5 percent over its operating range.

7.4 PERFORMANCE TEST DATA

The inspector must observe smelter operation and emission tests simultaneously to ensure that valid data are used in determining plant performance. The performance test checklist shown in Table 7.1 is based upon the observations described in Sections 7.1, 7.2, and 7.3. Suggested contents for stack test reports are given in Appendix E.

The reasons for having the inspector observe the test and complete the inspection sheet are twofold. First, smelter and control device parameters will serve as guidelines for future NSPS recordkeeping requirements; and second, the inspector's observation of a few major parameters ensures that the tests were properly conducted.

The emission testing firm is required to submit test reports to the facility and the control agency. Results from the testing firm must be carefully checked and compared with data from the inspector's form.

Table 7.1

NSPS INSPECTION CHECKLIST FOR SECONDARY LEAD SMELTERS
DURING PERFORMANCE TEST

Facility Name _____

Facility Address _____

Name of Plant Contact _____

Source Code Number _____

Unit Identification (To be tested) _____

Design Input Capacity _____ tons/day

Initial Start-up Date _____

Test Date _____

A. FACILITY DATA

Type ☐ Furnace No. of Furnaces _____
☐ Other Specify _____

Charging Method ☐ Batch ☐ Continuous

Control Devices ☐ Fabric Collector Specify Type _____
☐ Scrubber Specify Type _____
☐ Other

Operating Schedule _____ hrs/day _____ days/wk _____ wks/yr

B. OPERATING PARAMETERS

Data to Be Recorded During Performance Test[a]

Parameter	Clock Time
Charge Capacity	
Charge Rate	
Charge Lead Content	
Product Lead Content	
Period of Heat	
Oxygen Rate	
Compressed Air Rate	
Fuel Rate	
Pouring Temperature	

[a]Data should be recorded every 30 minutes

Table 7.4 (continued). NSPS INSPECTION CHECKLIST FOR SECONDARY LEAD SMELTERS DURING PERFORMANCE TEST

C. PRETEST DATA (OBTAIN FROM TEST TEAM FIELD LEADER)

Test Company _____

Field Leader _____

Duct Dimensions _____in. x _____ in.; Area _____ft^2

Nearest Upstream Obstruction _____ft

Nearest Downstream Obstruction _____ft

No. of Sampling Ports _____

No. of Sampling Points _____

No of Sampling Points Required From 40 CFR 60 _____

D. PARTICULATE PERFORMANCE TEST

Test No. _____ Start Time _____ Finish Time _____

☐ Yes ☐ No

Preliminary Traverse Run (Method 1)
Chosen Nozzle Diameter _____in.

Train Leak Check

Opacity Readings Taken

Moisture Determination (Method 4)
Percent Moisture _____
ml Collected/Gas Volume _____ml _____ft^3
(or wet/dry bulb readings)

Combustion Gas Analyser O_2 _____%
CO_2 _____%

Dry Gas Meter Reading Before Test _____ft^3 at _____(time)

Dry Gas Meter Reading After Test _____ft^3 at _____(time)

Volume Sampled _____ft^3

Table 7.1 (continued). HSPS INSPECTION CHECKLIST FOR SECONDARY LEAD SHELTERS DURING PERFORMANCE TEST

D. PARTICULATE PERFORMANCE TEST (continued)

Test Duration _____ minutes

Average Meter Orifice Pressure Drop _____ inches

Average Duct Temperature _____ °F

Velocity Head at Sampling Point _____ inches H_2O

Meter $\Delta H@$* _____

Repetition Start Time _____

Repetition Finish Time _____

E. CLEAN-UP PROCEDURE

Filter Condition	☐ Dry		☐ Wet
Probe Status	☐ Unbroken		☐ Broken
Glass Connectors	☐ Unbroken		☐ Broken
Clean-up Sample Spillage	☐ None	☐ Slight	☐ Major
Sample Bottle Identification	☐ Yes		☐ No
Acetone Blank Taken	☐ Yes		☐ No

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(5) Code of Federal Regulations. Title 40, Part 51 Revised as of July 1, 1976, General Services Administration, Washington, D.C. (1976)

(6) "Control Techniques for Particulate Air Pollutants," U.S. Department of Health, Education, and Welfare, Washington, D.C. (January 1969)

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(18) Stern, A.C., "Air Pollution, Volume III, Sources of Air Pollution and Their Control," Academic Press, N.Y. (1968)

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APPENDIX A

STANDARDS OF PERFORMANCE FOR SECONDARY LEAD SMELTERS

Chapter I - Environmental Protection Agency

SUBCHAPTER C - AIR PROGRAMS

PART 60 - STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES

Subpart L - Standards of Performance for Secondary Lead Smelters

§60.120 Applicability and designation of affected facility.

The provisions of this subpart are applicable to the following affected facilities in secondary lead smelters: Pot furnaces of more than 250 kg (550 lb) charging capacity, blast (cupola) furnaces, and reverberatory furnaces.

§60.121 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act and in Subpart A of this part.

(a) "Reverberatory furnace" includes the following types of reverberatory furnaces: stationary, rotating, rocking, and tilting.
(b) "Secondary lead smelter" means any facility producing lead from a lead-bearing scrap material by smelting to the metallic form.
(c) "Lead" means elemental lead or alloys in which the predominant component is lead.

§60.122 Standard for particulate matter.

(a) On and after the date on which the performance test required to be conducted by §60.8 is completed, no owner or operator subject to the provisions of this subpart shall discharge or cause the discharge into the atmosphere from a blast (cupola) or reverberatory furnace any gases which:

(1) Contain particulate matter in excess of 50 mg/dscm (0.022 gr/dscf).
(2) Exhibit 20 percent opacity or greater.

(b) On and after the date on which the performance test required to be conducted by §60.8 is completed, no owner or operator subject to the provisions of this subpart shall discharge or cause the discharge into

the atmosphere from any pot furnace any gases which exhibit 10 percent opacity or greater.

§60.133 Test methods and procedures.

(a) The reference methods appended to this part, except as provided for in §60.8 (b), shall be used to determine compliance with the standards prescribed in §60.132 as follows:

(1) Method 5 for the concentration of particulate matter and the associated moisture content,
(2) Method 1 for sample and velocity traverses,
(3) Method 2 for velocity and volumetric flow rate, and
(4) Method 3 for gas analysis.

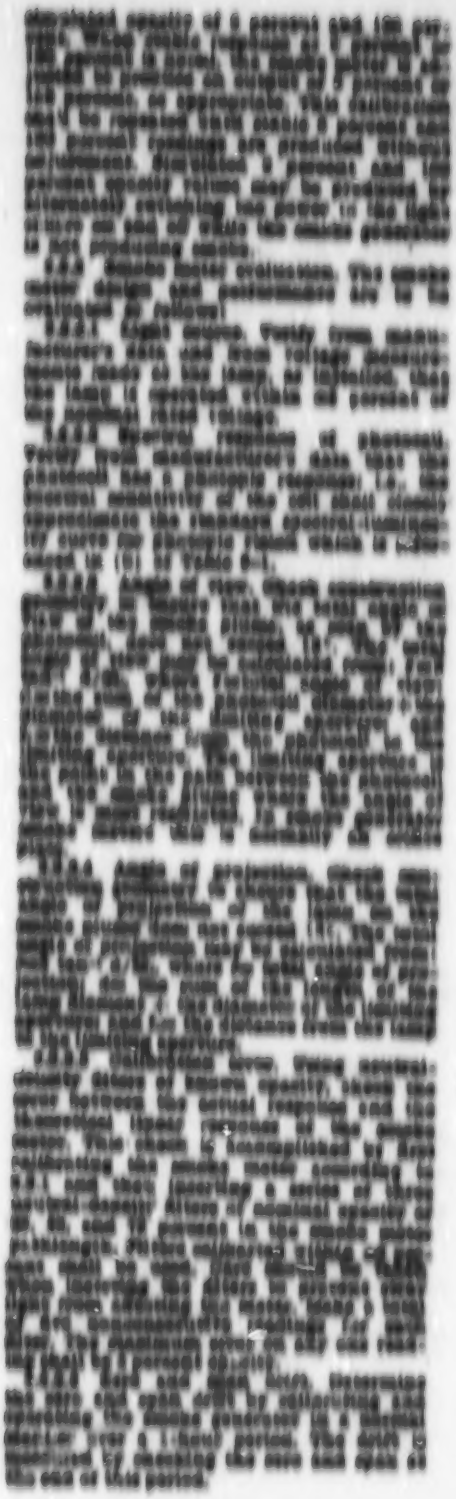
(b) For method 5, the sampling time for each run shall be at least 60 minutes and the sampling rate shall be at least 0.9 dscm/hr (0.53 dscf/min) except that shorter sampling times, when necessitated by process variables or other factors, may be approved by the Administrator. Particulate sampling shall be conducted during representative periods of furnace operation, including charging and tapping.

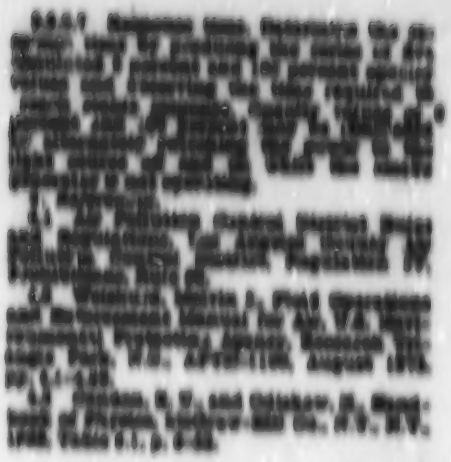
METHOD 9 - VISUAL DETERMINATION OF THE OPACITY OF EMISSIONS FROM STATIONARY SOURCES

[redacted]

[redacted]

[redacted]





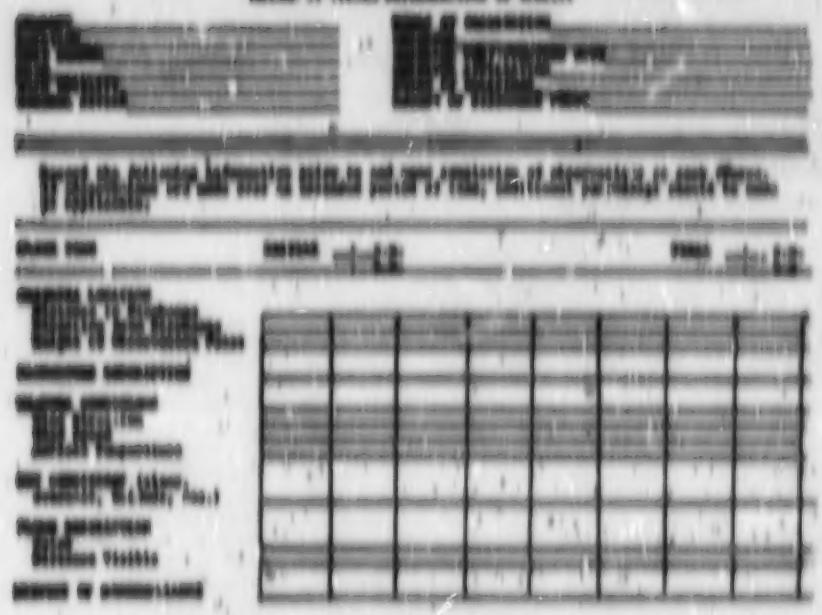


FIGURE B-6 OBSERVATION RECORD PAGE ___ OF ___

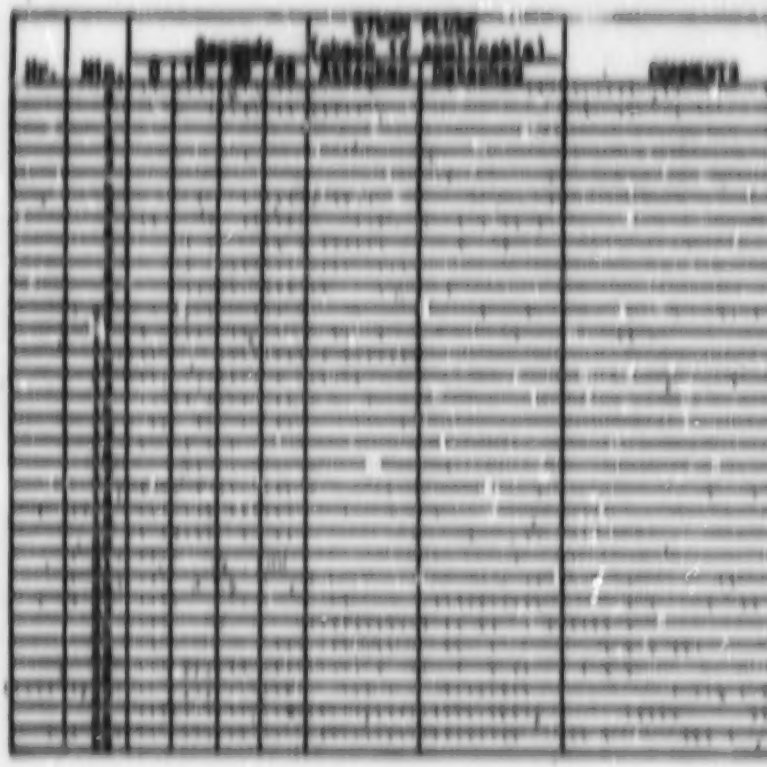
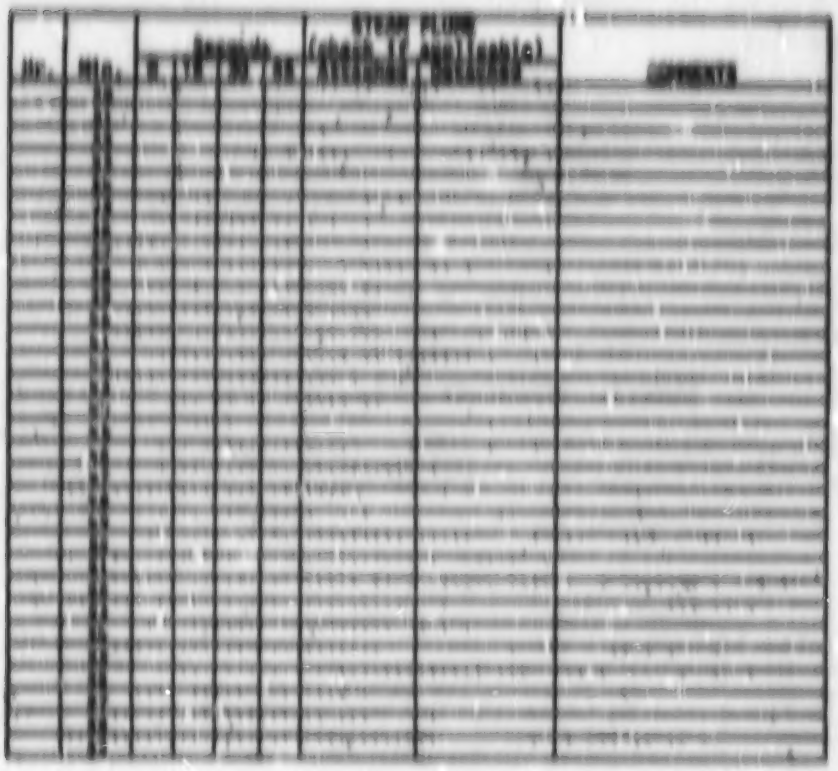


FIGURE 9-1 OBSERVATION RECORD (CONT.) PAGE ___ OF ___



8 12. - GENERAL POLICY ON THE USE OF SECTION 114 AUTHORITY FOR ENFORCEMENT PURPOSES

INTRODUCTION

The purpose of this guideline is to provide guidance relating to the exercise of the authority set forth in Section 114 of the Clean Air Act, as amended, for enforcement purposes.1/

USES OF SECTION 114

Use in Determining Status of Compliance

Section 114(a)(ii) provides that the Administrator may require the owner or operator of any source to provide information for the purpose of determining "whether any person is in violation of any such standard or any requirement of such a plan." This is one of the most important enforcement tools under the Clean Air Act, in that the source can be required to provide the information which may be the basis for enforcement action by EPA. Regions are urged to make extensive use of 114 for enforcement purposes since this is usually the most effective method of obtaining the necessary information to begin an enforcement action.

Uses During Emergency Episodes

Section 114(a)(iii) of the Act enables EPA to obtain information necessary to implement Section 303 authority (emergency episodes). During an emergency episode, it may be necessary to obtain recordkeeping by such owner or operator to ensure that he is taking appropriate action. This section can also be used to develop Section 303 emergency episode action plans, as discussed in General Enforcement Guideline 8.15.

1/ Section 114(a)(i) enables the Administrator to require owners or operators of emission sources "to (A) establish and maintain such records, (B) make such reports, (C) install, use, and maintain such monitoring equipment or methods, (D) sample such emissions (in accordance with such methods, at such locations, at such intervals, and in such manner as the Administrator shall prescribe), and (E) provide such other information, as he may reasonably require." Section 114(a)(2) authorizes right of entry for certain purposes and the right of the Administrator to sample emissions.

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REQUEST FOR INFORMATION

Section 114 Letter Format

The letter to an owner or operator should recite expressly that it is being sent pursuant to Section 114(a)(ii) or (iii), state specifically the information required, recite the penalties for non-compliance, and specify a reasonable time to answer. Generally it should be sent certified mail, return receipt required, to document receipt. In the letter, the Regional Office may require the source owner or operator to appear at a designated time and place to discuss the information required to be provided to EPA.

During an emergency episode a Section 114 letter should be delivered personally to the source owner or operator and a receipt should be obtained upon delivery.

Privilege Against Self-Incrimination

A problem may arise in the case of an individual who refuses to provide information on the grounds of the Fifth Amendment privilege against self-incrimination. This is not a problem with respect to a corporation, since a corporation does not have this privilege. However, except as discussed in the following, an individual, as opposed to the corporation, may refuse to answer any request for information under Section 114 if the information might tend to incriminate him. (See OGC memo dated 8/7/78). If an individual refuses to comply with the request for information on this ground, the Regional Office should consider itself on notice of a probable violation and should gather the information by other methods.

If the information needed from the source owner or operator is required to be kept under a recordkeeping provision of a State Implementation Plan, then the privilege may not be invoked, even by an individual. 1/ Thus, if an individual raises an objection on Fifth Amendment grounds, the State Implementation Plan should be checked to determine whether the plan requires such information to be kept by the source, and if it does, Fifth Amendment objections are not valid and the information must be provided.

1/ According to the Shapiro Doctrine, "the privilege which exists as to private papers cannot be maintained in relation to 'records required by law to be kept in order that there may be suitable information of transactions which are the subject of governmental regulations and the enforcement of restrictions validly established'".

The Section 114 letter need not call to the attention of the source owner or operator that he may have a right to invoke the privilege against self-incrimination nor need this be done at an onsight investigation. The Miranda warning is required only where a person is "in custody".

Federal Reports Act

Section 114 letters sent to persons suspected of being in violation of an implementation plan requirement or Section 303 are not subject to the Federal Reports Act. Identical letters may be sent to multiple sources without the need for securing OMB approval since this use of Section 114 is an enforcement function rather than the gathering of technical data for standard setting purposes.

Before sending out a Section 114 letter, check the NEDS data bank to determine whether EPA already has such information. However, where immediate enforcement action is contemplated, the Regional Offices should direct a Section 114 letter to the source regardless of the results secured from the data bank. Duplication of reported information can be avoided by advising the source of the information in our possession and affording the source the opportunity to confirm such information as responsive to the Section 114 inquiry. This practice will be necessary because information employed for enforcement purposes must constitute reliable evidence on the present status of compliance and be so represented by the source under pain of penalty for any misrepresentation. To proceed otherwise presents the prospect that a source may repudiate information in our possession on which we base a finding of violation, and we then would be forced to gather further proof to verify and substantiate our determination before commencement of any judicial proceedings.

Trade Secrets

It is anticipated that some of the information required by Section 114 letters will contain trade secrets. Although the information asked for must be provided, the source owner or operator can designate certain portions of his response confidential and EPA must treat it as such unless and until the Administrator determines that it is not entitled to protection as a trade secret. This determination should be made after the information has been submitted, if either the source owner or operator requires that such a determination be made or if someone else requests the information from EPA. Regional Offices can also make these determinations on their own initiative to keep down the amount of material which must be afforded confidential treatment. No determination or agreement will be made concerning trade secrets status prior to receipt of the

Section 114 information. The regulations in 40 CFR Part 2 outline the EPA procedures for making this determination.

ENTRY AND INSPECTION

Section 114(a)(2) enables the Administrator or his authorized representative to enter a source so that EPA can do its own monitoring, sampling, inspecting or copying of records. This authority also can be used to determine whether a source is carrying out any obligations imposed on it by EPA under Section 114(a)(1).

The term "authorized representative" would include specific individuals from each Regional Office, preferably permanently designated to give a sense of continuity and familiarity with the tasks. This does not mean that other Regional Office or EPA employees cannot perform such tasks on an ad hoc basis when necessary to achieve EPA objectives.

A contractor for EPA or other person assisting EPA in carrying out its functions may be designated as an "authorized representative" for specific purposes which should be stated in a letter granting such representative status to the contractor. However, if the contractor is refused entry by the source owner or operator despite this letter, it is not advisable to request a U.S. Attorney to obtain a search warrant to gain entry for the contractor, since a judge would most likely refuse to issue one. EPA personnel should perform the task themselves if such a situation arises or accompany the EPA contractor performing the work.

Where a state has been delegated Section 114 authority from EPA, the same authority EPA has to monitor, sample, inspect or copy records, and any other authority under Section 114(a)(1) and (2) of the Clean Air Act can, in like manner be exercised by the State. No representative of EPA need accompany the state officials.

Section 114(a)(2) requires that the person exercising the right of entry should have credentials. EPA has established a procedure governing the issuance and control of credentials. Regional Offices may obtain such credentials in accordance with the procedures. The Regional Offices can still issue their own credentials to carry out Section 114 in the period until the procedures in the EPA order can be implemented or in unusual circumstances. If the Regional Office chooses to issue its own credentials in such instances, such credentials should contain the agency name; the bearers name, signature, and photograph; the division in the agency with which he is employed; the quotation of Section 114 authority under which entry is sought; and a

citation of the penalties for noncompliance with Section 114. The credentials should be signed by the Regional Administrator. Credentials can also be issued by the Regional Office in the form of a letter on an ad hoc basis where there is not sufficient time to obtain more permanent credentials. The letter should contain all of the information that is in the permanent credentials except the photograph and signature of the bearer.

Entry for Section 114 purposes should be confined, except in emergencies, to normal business hours to minimize inconvenience to the source.

Safety Equipment

A source owner or operator has no responsibility to supply EPA inspection teams exercising Section 114 authority with safety equipment such as hard hats or shoes. EPA should provide whatever equipment is necessary for an inspection team to safely perform those duties entrusted to them by law.

Visitors Releases

Members of inspection teams exercising Section 114 authority should not sign waivers or "visitors releases" that would absolve the company of responsibility of injury due to negligence. In a memo to all Regional Counsels dated November 8, 1973, from John Quarles, it is stated that "Inasmuch as the Clean Air Act . . . grant(s) EPA employees a right of entry to corporate facilities, a company may not lawfully condition the exercise of this right upon the signing of a release or indemnity agreement." "When a firm refuses entry to an EPA employee performing his function under the Clean Air Act, the employee may appropriately cite the statute and remind the company of EPA's right to seek judicial enforcement. If the company persists in its refusal, EPA should go to court in preference to signing a 'Visitors Release'".

Search Warrants

If a source owner or operator refuses to admit EPA authorized representatives attempting to exercise Section 114 responsibilities, entry cannot be made until a search warrant is obtained. Appropriate Regional personnel should be notified so that they can request that the U.S. Attorney obtain a search warrant. (OGCE is developing a model application for a search warrant and a model search warrant for use by the Regional Offices). If any delay is anticipated from a source in permitting the exercise of Section 114 authority and such delay is unacceptable to the successful completion of EPA tasks, a

search warrant should be obtained. If delay is anticipated even with a search warrant, it can be requested that the search warrant be written so that immediate entry be granted.

ENFORCEMENT PROCEDURES

Section 113(a)(3) provides that if the Administrator finds that any person is in violation of any requirement of Section 114, he may bring a civil action or issue an administrative order. Guideline 84, outlines procedures relevant to the commencement of a civil action or issuance of an administrative order.

In cases of failure to comply with Section 114, issuance of an administrative order is more appropriate. However, in most cases regional enforcement personnel will want to phone the source prior to the issuance of such an order to determine the reasons for the source owner or operator's failure to comply. If the source owner or operator continues his refusal to comply after the phone call, issuance of the order should proceed. The order should include a final date for compliance, and should specify a date for an opportunity to confer pursuant to Section 113(a)(4) prior to the effective date of the order. If the source owner or operator violates the order, civil and criminal action will then be appropriate.

While there are no criminal penalties for refusing to comply with Section 114 per se, a knowing failure to comply with any order issued under Section 113 relating to a Section 114 violation would subject the violator to criminal penalties of up to $25,000 per day or imprisonment for not more than one year, or both, for the first offense. Criminal penalties are also appropriate in the case of any person who knowingly makes any false statement or tampers with any monitoring device. The criminal penalties specified in Section 113(c)(2) for a violation of this type are a fine not to exceed $10,000 or imprisonment for not more than six months, or both. (See Guideline 5.0, General Policy on Commencement of Criminal Actions Pursuant to Section 113(c)).

APPENDIX D

SUGGESTED CONTENTS OF STAGE TEST REPORTS

CONTENTS OF STACK TEST REPORTS

In order to adequately assess the accuracy of any test report the basic information listed in the following suggested outline is necessary:

(1) Introduction. Background information pertinent to the test is presented in this section. This information shall include, but not be limited to, the following:
   (a) Manufacturer's name and address.
   (b) Name and address of testing organization.
   (c) Names of persons present, dates and location of test.
   (d) Schematic drawings of the process being tested showing emission points, sampling sites, and stack cross-section with the sampling points labeled and dimensions indicated.
   (e) Brief Process Description

(2) Summary. This section shall present a summary of test findings pertinent to the evaluation of the process with respect to the applicable emission standard. The information shall include, but not be limited to, the following:
   (a) A summary of emission rates found.
   (b) Isokinetic sampling rates achieved if applicable.
   (c) The operating level of the process while the tests were conducted.

(3) Procedure. This section shall describe the procedures used and the operation of the sampling train and process during the tests. The information shall include, but not be limited to, the following:
   (a) A schematic drawing of the sampling devices used with each component designated and explained in a legend.
   (b) A brief description of the method used to operate the sampling train and procedure used to recover samples.

(4) Analytical Technique. This section shall contain a brief description of all analytical techniques used to determine the emissions from the source.

(5) Data and Calculations. This section shall include all data collected and calculations. As a minimum, this section shall contain the following information:
   (a) All field data collected on raw data sheets.
   (b) A log of process and sampling train operations.

(c) Laboratory data including blanks, tare weights, and results of analysis.
(d) All emission calculations.

(6) Chain of Custody. A listing of the chain of custody of the emission test samples.

(7) Appendix:

(a) Calibration work sheets for sampling equipment.
(b) Calibration or process logs of process parameters.